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Ethnopharmacology of Medicinal Plants used in North Kordofan (Western Sudan)

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Abstract

Urban and rural people of North Kordofan (Western Sudan) inherited a rich traditional medicinal knowledge. The preservation and documentation of this knowledge is a matter of prime importance. This will not only provide recognition of this knowledge but will also help in conservation of such gradually vanishing endangered semi/arid plant species. The present paper provide ethnopharmacological information of 48 taxa distributed into 26 families. For each plant species listed, the botanical name, family, vernacular name, part used, uses/ailments treated, preparations/administrations, use (%) and locality are given. Among the major findings: *Acacia nilotica* ssp. *nilotica* as hypertensive; *Balanites aegyptiaca* for diabetes; *Ceiba pentandra* for relieve toothache; *Geigeria alata* for diabetes, cough, intestinal complaints and as antispasmodic; *Guiera senegalensis* for jaundice; *Hibiscus sabdariffa* in cases of hematuria and *Justicia flava* smeared on gingiva in cases of teeth pain.

Keywords: Folk medicine; North Kordofan; Western Sudan; Medicinal plants; ethnobotany; conservation.

Introduction

Plants have always played a major role in the treatment of human traumas and diseases worldwide [1]. They have been used as sources of modern drugs, either by providing pure compounds, starting materials for partial synthesis of useful compounds or models for synthesis of new drugs [2]. Ethnopharmacological information is an important tool in drug discovery [3]. From the ethnobotanical point of view North Kordofan is one of the least studied regions of Western Sudan. The only work existing for a few areas of this region is compiled by EL-Ghazali et al., 1997 [4].

Information about medicinal plants is still passing from one generation to another by oral communication, posing the danger of loosing some knowledge. There is, therefore, a need to document medicinal plants in Sudan before both the provider of information disappear. Meanwhile most of these plants was already endangered by the arid/semi arid climatic conditions and man-made activities.

Study area

North Kordofan region (Western Sudan) lies between latitude 12° 43' – 13° 42' N and longitude 30° 14' – 31° 55' E. It is characterized by a dry, hot climate, typically tropical continental with a relatively short rainy season. The soils of the study area are mostly stabilized sand dunes “Goz” consisting of yellowish red sandy loam and loamy sand soils [5].

Population

From the ethnobotanical point of view, North Kordofan is an interesting region, since in ancient times. It was subject to the cultures of several people such as Arabs and Africans. Agricultural (millet, sorghum, groundnuts and sesame), pastoral (cattle and goats) activities characterize the way of life of the people in the region. Ethnically, population composition in the region can be classified as nomadic and sedentary tribes. The major groups are all Arabs and include Kababish, Kawahla, Hamr, Hawawir and the Maganin tribes. The sedentary groups, which also are mainly Arab, include Dar Hamid, Danagla, Gawamaa and Bedaireia. A few sedentary tribes are non-Arab; they are mainly of Hausa and Fulani origin and have come from West Africa [6].

Methodology

Fieldwork

The study was conducted during June - September 2003 in five localities, namely, Tendalti, Umm Rawaba, Er-Rahad, EL-Obeid and Bara (North Kordofan, Western Sudan).

The information was gathered from urban and rural inhabitants knowledgeable on indigenous herbal medicine by personal interviews (56 interviewees). Questions about the use of various medicinal plants were asked using classical means of ethnobotanical analysis [7], [8]. The interviews were in the form of group discussions, in groups of three or four people, except for the traditional healers who preferred confidentiality.

Plant materials of all the taxa reported were collected either by author and shown to the informants, or by the informants and shown to us or by the informants, or by us together. During fieldwork plant materials were collected for preparation of herbarium specimens and for biological and chemical testing. The plants were identified using the Flowering Plants of the Anglo-Egyptian Sudan [9-11] and the Flora of the Sudan [12] and also by comparison with herbarium specimens in the Botany Department, Khartoum University, Faculty of Science. Voucher specimens were deposited in the Botany Department, Omdurman Islamic University.

Data Analysis

All the data obtained have been integrated and analyzed. The results have been structured according to these categories: number of plants mentioned (with scientific Latin name, botanical families and vernacular (popular) names; part used; uses/ailments treated; preparations/administrations; use frequency (%) and localities.

To assess the degree of originality and novelty of the uses claimed by the informants, these were compared with those reported in several works on ethnobotany, medicinal plants and phytotherapy. The complete references were given in Farnsworth, 1995 [13]. Study of quantitative ethnobotany was also performed, the use frequency per species was estimated by calculating the proportion of plants cited and utilized in relation to the total number of interviewees.

Discussion

The data recorded during this study were compared with the related literature and also published reports on the traditional medicinal uses of the plants. Some species, namely, *Abutilon panosum*, *Blepharis linariifolia*, *Cassia absus*, *Dobera glabra*, *Justicia flava*, *Ethulia conyzoides*, *Xeromphis nilotica*, *Tinospora bakis* and *Striga hermonthica* have never been described in the ethnobotanical literature of Sudan. For other species, namely, *Acacia nilotica* ssp. *nilotica*, *Cissus quadrangularis*, *Geigeria alata*, *Hibiscus sabdariffa* and *Ziziphus spins-christi*, new therapeutic uses have been reported.

Some papers reporting phytochemistry of the following species: *Acacia nilotica* ssp. *nilotica*, *Cassia absus*, *Cassia tora*, *Guiera senegalensis*, *Cinchona officinalis*, *Cissampelos pareira* and *Cocculus pendulus* have been published [12]. The pharmacological studies on *Croton zambesicus* fruits, *Geigeria alata* aerial parts are probably lacking and investigations in this direction are also greatly needed. *C. zambesicus* extracts from leaves cytotoxic and from stem bark antimicrobial [14]. *Albizia anthelmintica* extracts have been studied in some pharmacological studies, and anthelmintic activity [15-17] has been demonstrated. Further research on *Guiera senegalensis* will reveal its medicinal potential and facilitate its use as a standardized herbal drug.

In the drug development research, biological activity based on ethnomedical uses seems as a better approach compared to randomly selected plants [18 & 19]. We are currently testing these plants for some biological activities to confirm the therapeutical claims indicated by informants. Any useful information from literature review and biological tests will be passed back in order to improve the proper use of medicinal plants and create a good relationship for future ethnobotanical studies.

The reasons for the frequent use of traditional medicine being (i) the strong association of people with local flora and their belief on traditional knowledge regarding plants as medicine, (ii) easy availability of local medicinal plants, (iii) relatively poor access to synthetic drugs and their high cost and (iv) lower economic profile of the people.

The data provided by our informants and analyzed in the present paper clearly show that folk knowledge on medicinal plants and plant uses is still alive in the studied region. This indicates that ethnobotanical studies constitute a valuable first step in the bioprospection process, which may lead to the development of new plant-based medicines by phytotherapeutical research.

Conclusion

Modern health care services provided in North Kordofan region are not adequate, since the health care centres/hospitals are few and sometimes distantly located, and most people cannot afford to buy drugs prescribed due their low income. Herbal medicine keeps working as the most popular medicine in solving health problems in the region, and people have strong trust in the efficacy of herbs. Due to limited resources, only five localities were visited and it was noted that some plants were not readily available due to season conditions during the study period. It was recommended that future work in this region should be carried out immediately after the rainy season for one to be able to record a large number of medicinally useful plants, especially the annual herbs.

Teamwork consisting of a good number of taxonomists is recommended for any future ethnobotanical surveys, in order to have broad scope of study leading to a rich documentation of medicinal plants in this region.

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Table 1. Medicinal uses of plants in some localities in North Kordofan (Western Sudan).

Scientific name/Family/ Local name	Part Used	Uses/ailments Treated	Prepararions/ Adminstrations	Use Frequency %	Locality
<i>Abutilon pannosum</i> (Forst.f.) Schlecht., Malvaceae, Irg el Nar.	Root	Jaundice	Decoction	8.93	Bara
<i>Acacia nilotica</i> ssp. <i>nilotica</i> , Mimosaceae, Garad (Sunt)	Crushed pods	Hypertension	Cushin (at sleeping)	5.36	Umm-Rawaba
<i>Adansonia digitata</i> L., Bombacaceae, Tabaldi (Gongoleis)	Fruit pulp Fresh leaves (mixed with sesame seeds)	Fever, Diarrhea	Infusion	71.43 40.37	El-Obeid
<i>Aerva javonica</i> (Burn.f) Juss.exSchult., Amaranthaceae, Shabbi	Herb	Abdominal pain	Decoction	3.57	Umm-Rawaba
<i>Albizzia anthelminica</i> A.Brongn, Mimosaceae, Umm Takirni (Gerf addud)	Stem bark	Anthelmintic	Powder (with yoghurt)	8.93	Tendelti
<i>Aristolochia bracteolata</i> Retz., Aristolochiaceae, Irg el Agrab.	Chewed Fresh root	Scorpion Sting	Rubed (on legs)	12.5	Tendelti
<i>Azadirachta indica</i> A. Juss., Meliaceae, Neem	Leaf leaf	Antipyretic Backache	Cushion (at sleeping) Steam	19.64 10.0	Er.Rahed El-Obeid
<i>Balanites aegytiaca</i> (L.)Del., Balanitaceae, Higlieg (Lalob)	Fruit pulp	Antispasmodic, Stomach pain, Diabetes.	Infusion	70.00 30.00	Er-Rahad, Bara.
<i>Blepharis linariifolia</i> Pers., Acanthaceae, Begheil.	Fruit	Stomach pain, Urinary disorders (Kidney stone)	Decoction	1.79	Bara
<i>Borassus aethiopium</i> Mart., Palmae, Doleib	Fruit	Stomach pain	Eaten	5.36	Umm-Rawaba
<i>Calotropis procera</i> (Ait) Ait.f., Asclepiadaceae, Ushar	Latex Root	Haemorrhoids Scorpion sting	Paint Decoction	3.57 1.20	El-Obeid
<i>Carrisa edulis</i> Vahl., Apocynaceae, Allali.	Root Root	Kidney disorders In cases of Charm and madness	Infusion Fumigation	17.86 12.30	El-Obeid
<i>Cassia absus</i> L., Caesalpiniaceae, Habat el-Ain	Fruit	Eye troubles	Applied on eye	5.36	Umm-Rawaba

<i>Cassia occidentalis</i> L., Caesalpinaceae, Soreib.	Roasted seeds	Backache, as an antihypertensive	Decoction	53.57	Um-Rawaba El-Obeid
<i>Cassia senna</i> L., Caesalpinaceae, Sana Sana.	Fruit	Stomach pain	Infusion	8.93	El-Obeid
	Root	Jaundice	Infusion	3.45	El-Obeid
	Leaf	Stomach pain	Eaten fresh (with onion)	2.67	El-Obeid
<i>Cassia tora</i> L., Caesalpinaceae, Kawal.	Seed	Jaundice	Powder (mixed with yoghurt or with porridge water made from millet flour).	55.36	El-Obeid, Bara, Umm Rawaba
<i>Ceiba pentandra</i> (L.) Gaertn. Bombacaceae, Gotton Harray.	Stem bark	To relieve toothache	Fresh locally applied	7.14	Umm-Rawaba
<i>Chrozophora plicata</i> (Vahl.) A.Juss ex., Euphorbiaceae , Argassi	Root	Wounds	Fresh (directly applied on affected parts)	1.79	Bara
<i>Cinchona officinalis</i> L., Rubiaceae , Kina.	Stem bark	Dysentery, Jaundice	Infusion	19.64	El-Obeid
<i>Cissampelos pareira</i> (non L.) Broun and Massey , Menispermaceae, Irg el Kail	Root	Heart burn, Abdominal disturbances, in cases of charm.	Chewed	5.36	Er-Rahad
	Root	Malarial fever	Decoction or infusion	4.36	
<i>Cissus quadrangularis</i> L., Ampelidaceae, Salaala	Root	Haemorrhoids	Powder (applied to anus)	1.79	Tendelti
22. <i>Clerodendrum capitulum</i> (Willd.) Schum. and Thonn. var. <i>capitulum</i> , Verbenaceae, Gung	Root	Tonic	Powder (eaten with meat)	1.79	El-Obied
<i>Cocculus pendulus</i> (J.R. and G.Forst.) Diels., Menispermaceae, Zegai.	Aerial part	Antipyretic	Decoction	1.79	Er-Rahad
<i>Combretum glutinosum</i> Perr.ex DC., Combretaceae, Habil	Wood	To relieve fever, Rheumatism	Fumigation	21.43	El-Obeid
	Leaf	Headache, Antispasmodic	Decoction	6.13	
<i>Cordia abyssinca</i> R.Br., Boraginaceae, Andrab (Gambil)	Internal stem bark	Cuts and wounds	Fresh (rubbed locally)	3.57	Er-Rahad
	Stem bark	In cases of circumcision	Powder	1.21	
	Stembark	Burns	Ash (mixed with yoghurt) applied locally.	7.01	

<i>Croton zambesicus</i> Muell.Arg., Euphorbiaceae, Umm Gleila	Fruit	To relieve cough	Powder (in sesame oil) applied on chest	41.07	Er- Rahad, El- Obeid, Umm Rawaba
<i>Cucumis dispaccus</i> Ehrenb. ex Spach., Cucurbitaceae , Agour El-Kilab	Stem	Anti-emetic	Decoction	3.57	Er-Rahad
<i>Datura innoxia</i> Mill., Solanaceae, Sekaran	Seed	To relieve toothache	Smoke (directed into the mouth)	8.93	Umm- Rawaba
<i>Detarium senegalense</i> J.F. Gmel., Caesalpinaceae, Abuleila	Wood	Rheumatism	Fumigation	10.71	El-Obeid
<i>Dichrostachys cinera</i> (L.) Wight and Arn. var. <i>Karamojensis</i> Brenan and Brummitt , Kadad	Stem bark	Wounds	Fresh (directly applied)	8.93	Er-Rahad
<i>Dobera glabra</i> (Forsk.) R.Br., Salvadoraceae, Meikah	Wood	Swellings	Ash (paste)	3.57	Umm- Rawaba
<i>Ethulia conyzoides</i> L.f., Asteraceae , Abwelaefain	Fruit	Stomach pain	Eaten	1.79	Er-Rahad
<i>Geigeria alata</i> (DC.) Benth. and Hook. ex Oliver and Hiern, Asteraceae, Gud-gat.	Herb	Diabetes, cough, intestinal complaints, antispasmodic , antihypertensive.	Decoction	53.57	Umm- Rawaba, Er- Rahad, Tendelti
<i>Guiera senegalensis</i> J.F. Gmel., Combretaceae, Ghubeish.	Leaf	Stomach pain , Jaundice, Malarial fever, Antispasmodic.	Decoction	94.64	Er- Rahad, Umm- Rawaba
	Root	As a tonic.	Decoction	2.46	
<i>Hibiscus sabdariffa</i> L., Malvaceae , Karkadeh.	Calyx	Snake bite and scorpion sting.	Decoction	7.14	El-Obeid
		Headache, in cases of hematuria.	Infusion	3.57	El-Obeid
<i>Jatropha glauca</i> Vahl., Euphorbiaceae, Shagarat Es-Sim	Seed	Laxative	Eaten	1.79	Bara
<i>Justicia flava</i> Vahl., Acanthaceae, Mahlab	Seed	Smearred on gingiva in cases of teeth pain, to relieve nausea.	Powder	19.64	Um- Rawaba El-Obeid
<i>Khaya senegalensis</i> (Desr.) A.Juss., Meliaceae, Mahogany	Stem bark	Malarial fever, Intestinal complaints.	Infusion	10.71	Er-Rahad
		Asthma	Infusion (mixed with <i>Guiera senegalensis</i> leaves)	5.20	

<i>Leptadena pyrotechinca</i> (Forsk.) Decne , <i>Asclepiadaceae</i> , Marakh	Stem	Rheumatism	Fumigation	5.36	Bara
<i>Manihot esculenta</i> Crantz., <i>Euphorbiceae</i> , Bavra	Tuberous root	To relieve ear pain (Cassava roots constitute the staple food for Hausa tribe).	Infusion (dropped on ear)	19.64	Umm- Rawaba
<i>Momordica balsamina</i> L., <i>Cucurbitaceae</i> , Ira-ira	Leaf	Antispasmodic	Infusion	5.36	Umm- Rawaba
<i>Nauclea latifolia</i> Sm., <i>Rubiaceae</i> , Karmadoda.	Fruits	Headache, cough, Antihypertensive, Kidney disorders.	Infusion (mixed with <i>Acacia nilotica</i> fruits and date palm fruits.)	17.86	El- Obeid, Umm- Rawaba
<i>Solanum albicaule</i> Kotschy ex Dunal, <i>Solanaceae</i> , Dayoug.	Fruit	Hair tonic , dandruff	Wash (boiled in sesame oil)	3.57	El-Olied
<i>Striga hermonthica</i> (Del.) Benth., <i>Scrophulariaceae</i> , Buda	Whole Plant	Diabetes	Decoction	7.14	Bara
<i>Ricinus communis</i> L., <i>Euphorbiaceae</i> , khirui	Fresh Leaf	To relieve Pain.	Rubbed on Joints	12.5 bara	Bara
<i>Tinospora bakis</i> (A.Rich.) Miers., <i>Menispermaceae</i> , Irg el Hagar	Root	Abdominal pain	Decoction	3.57	Er-Rahad
<i>Xeromphis nilotica</i> (Stapf.) keya, <i>Rubiaceae</i> , Shagarat el Murfaein.	Aerial part	Swellings, tonsillitis, dandruff.	Poultice	3.57	Umm- Rawaba
	Aerial part	Jaundice	Decoction	2.33	Umm- Rawaba
	Aerial part	Dandruff	Head wash	1.67	Umm- Rawaba
	Root juice				
<i>Ziziphus spina -christi</i> (L.) Des., <i>Rhamnaceae</i> , Sidr.	Stem bark	Antispasmodic	Decoction	8.93	El-Obeid
	Root	Antispasmodic, to relieve fever	Decoction	3.57	El-Obeid